



MORRISON KNUDSEN CORPORATION

**VASQUEZ BLVD./I-70 RI  
TECHNICAL MEMORANDUM**

**TO:** Bonnie Lavelle

**DATE:** January 20, 2000

**FROM:** Marta Green 

**RE:** RAC Contract No. 68-W7-0039  
WA 004-RICO-089R

**SUBJECT:** DRAFT TECHNICAL MEMORANDUM  
INITIAL PHASE III SAMPLING PROGRAM

# **Draft Technical Memorandum**

## **Vasquez Blvd./I-70**

### **Initial Phase III Sampling Program**

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#### **1.0 INTRODUCTION**

Morrison Knudsen (MK) was tasked by the U.S. Environmental Protection Agency (EPA) Region VIII to perform sampling of residential properties at the Vasquez Boulevard(VB)/I-70 Site under the Response Action Contract No. 68-W7-0039, Remedial Investigation Work Assignment 004-RICO-089R. This work was performed as part of the VB/I-70 Phase III Sampling Program outlined in the Project Plan (ISSI, August 4, 1999).

The Site covers approximately five square miles including all or part of the following five neighborhoods in the northern portion of Denver, Colorado: Cole, Clayton, Elyria, Globeville, and Swansea. The Initial Sampling Program of Phase III targeted residential properties, schools and parks that had not previously been sampled during the 1998 Phase I and Phase II programs. All of the Phase III properties were targeted for surface soil (0-2") sampling, and selected properties also were subject to garden vegetable/soil and/or indoor dust sampling. Sample collection and analysis was conducted to determine levels of arsenic and lead at these properties.

Under the Initial Sampling Phase III Sampling Program, MK was responsible for:

- Assisting with Project Plan preparation, including development of Standard Operating Procedures (SOPs)
- Establishing a field office and field laboratory
- Procuring subcontractors, equipment, and supplies
- Obtaining written consent for property access
- Collecting soil, vegetable and indoor dust samples
- Preparing and archiving soil samples
- Analyzing soil samples by X-Ray Fluorescence Spectroscopy (XRF)
- Coordinating off-site analysis of vegetables and dust
- Managing field and analytical data
- Managing Geographical Information Systems (GIS) data
- Providing community relations support

Sampling was performed July 26, 1999 through December 7, 1999. MK completed sampling at 1550 residential properties, four schools and one park. Sample preparation and XRF analysis was performed on 8447 samples, including 5847 field samples and 2600 quality control samples. The program is summarized in the attached two tables, site-wide soil sampling map, and six work area maps, and is described in the following sections:

- 2.0 Property Access
- 3.0 Personnel Training
- 4.0 Soil Sampling
- 5.0 Garden Vegetable and Soil Sampling
- 6.0 Indoor Dust Sampling
- 7.0 Sample Preparation
- 8.0 XRF Analysis
- 9.0 Off-Site Laboratory Analysis
- 10.0 Health and Safety
- 11.0 Data Management

## **2.0 PROPERTY ACCESS**

The Phase III target properties were initially identified based on those residential properties within the study area, as listed in the 1998 tax assessor records provided by PDC, that were not previously sampled in Phase I or Phase II. Each property address meeting this criteria through the database query was then verified, and those adjacent to but beyond the study area boundary were excluded from the target property list.

Written consent for property access was obtained prior to sample collection. MK performed an initial mailing on June 11, 1999 to the owners recorded in the PDC data, and provided an access agreement to be signed and returned. Door-to-door access efforts were conducted for two weeks in July and continued throughout the program. Access agreements also were provided and received at public meetings and community events. In total, 1,584 residential property access agreements were received, which is over 60% of the target properties.

## **3.0 PERSONNEL TRAINING**

Personnel training to the Project Plan, Health and Safety Plan and community interface procedures was conducted July 23, 1999, with follow-up as appropriate for revised procedures and new personnel. Additionally, MK held daily meetings with all field personnel to review procedures, quality control requirements, health and safety protocol, and any issues or questions. Field operations were managed by the MK Site Manager and Field Supervisor, and were implemented by both MK personnel and subcontractor personnel provided by Envirostaff, Inc.

## **4.0 SOIL SAMPLING**

On July 26, 1999 sample crews began residential soil sampling operations under the guidance of the Site Manager and Field Supervisor. EPA immediately determined that revision was needed to the Residential Soil Sampling SOP; therefore, the soil sampling operations were ceased pending release

of the revised procedure and Project Plan on August 4, 1999.

All soil samples were collected in general accordance with the Project Plan and SOP ISSI-VBI70-02, with the following exceptions and clarifications:

- Alley way sampling was not performed due to a lack of unpaved alleys
- Paperwork for multiple days of sampling was issued to field crews
- Color coded labels were not used
- Excess soil material was not contained but rather left at the point of sampling
- Sod was cut and removed prior to advancing the soil auger in order allow replacement of the sod
- Subsamples were collected and homogenized in a stainless steel bowl to allow thorough homogenization and removal of stones and vegetation, rather than placement directly into the sample bag
- A modified surface soil data sheet was used
- Rinse blanks were collected a frequency of 3.5%
- The following schools were sampled :
  - Clayton Foundation, 3605 MLK Blvd. - Headstart Playground; Barth Hall Playground; Hallet Hall Playground; Garfield Montessori Playground
  - Family Star Montessori, 1331 E. 33<sup>rd</sup> Ave. - School Yard; Playground; Vacant Lot
  - Northeast Montessori Child Care Ctr., 3503 Marion St. - School Yard
  - Wyatt-Edison School, 3620 Franklin St. - School Yard
  - Potential New School, 3100 E. 40<sup>th</sup> Ave. - Yard
- Annunciation School was not sampled due to conditions imposed on property access
- Johnson Headstart was not sampled as it no longer exists in the study area
- St. Charles Place Park was added to the sampling program

Field audits resulted in recommendations for more detailed entries in field logs and adjusted flag placement. One hundred seventy-four rinse blanks were collected to demonstrate effective decontamination of soil sampling equipment. None of the audit findings or procedural deviations are expected to affect data quality or usability.

MK prepared maps that were updated twice monthly showing properties remaining to be sampled in each of six MK work areas. Errors in the available property address data resulted in sample collection at 15 properties for which access had not been received. Nine properties were inadvertently sampled twice due to property address errors and mis-communication.

## **5.0 GARDEN SOIL AND VEGETABLE SAMPLING**

MK collected soil samples and vegetables from residential gardens. Candidate gardens were identified using information on yard sampling data sheets and phone contact to determine whether vegetables remained available. Personnel training and sampling began on October 7, 1999 and was completed in two weeks. A total of 19 residential gardens were sampled with 76 vegetables collected. Garden samples were collected in general accordance with the Project Plan and SOP No. ISSI-VBI70-06, with the following exceptions and clarifications:

- Vegetables were stored in a freezer following sample collection and prior to shipment to the laboratory
- Vegetable samples were prepared by homogenizing and then freeze drying
- Samples were digested in an open container

## **6.0 INDOOR DUST SAMPLING**

MK collected dust samples from the interior of residential homes using a high volume vacuum sampler (HVS3 model leased from Envirometrics, Inc). Candidate homes were identified based on a stratified random analysis and resident consent for interior access. One composite dust sample per home was collected from each of 76 homes between October 20, 1999 and November 23, 1999. Samples were collected in general accordance with the Project Plan and SOP No. ISSI-VBI70-04 (as modified 11/12/99), with the following exceptions and clarifications:

- Flow rate over level loop or hard surfaces was initially (Oct. 20 - Nov. 17 14:15) set at 5 inches of water, in accordance with the instrument operation manual
- Flow rate over level loop or hard surfaces was subsequently (Nov. 17 14:15 - Nov. 23) set at 6.5 inches of water based on a recommendation from the Field Quality Assurance Coordinator during an audit.
- SOP specifies 7.8 liters per second (L/s), which converts to either 5.6 inches of water (level loop) or 6.5 inches of water (non surface-specific) using the conversions in the operation manual.
- Flow rate fluctuated during sample collection
- Samples were collected in ziplock bags prior to November 7, 1999

These procedural deviations are consistent with HVS3 manufacturer's recommended practices and therefore are not expected to affect the data quality or usability.

## **7.0 SOIL SAMPLE PREPARATION**

MK prepared and analyzed all of the soil samples collected. Sample preparation procedures were modified during the first month of the project. All samples prepared prior to the first SOP revision issued August 4, 1999 were re-prepared to include grinding of bulk soil. Samples prepared prior to the second SOP revision on August 25, 1999 were sieved and then dried and ground, while samples prepared after August 25, 1999 were dried, then sieved and ground. All sample preparation and associated quality control sample collection was performed in general accordance with the Project Plan and SOP No. MK-VBI70-05, with the following exceptions and clarifications:

- Homogenization was achieved through continuous mixing required to sieve wet samples when implementing SOP Rev. 0 and Rev. 1
- Homogenization was achieved through kneading and side to side mixing of the entire sample in its bag when implementing SOP Rev. 2, as this method produce a more visually homogenous sample than the recommended stirring (which produced clumping) and end-over-end mixing

The degree to which a sample can be homogenized is dependent on the matrix. Based on results of a variability test on homogenized samples, the sample preparation methods described above achieved low variability within each soil sample.

## **8.0 XRF ANALYSIS**

Energy dispersive X-ray fluorescence spectrometry (EDXRF) technology was specified in the SOP as the field analysis technique based on the project required sensitivity and MK's experience with this instrumentation. MK leased a QuanX unit from Kevex Spectrace to perform metals analysis on soil samples. The QuanX is a mobile, but not hand-held, instrument and requires a continuous power supply. Sample analysis was performed in accordance with the Project Plan and SOP No. MK-VBI70-06, with the following exceptions and clarifications:

- System date was verified during the initial calibration verification
- Electronic results files were readable without performing the Lotus conversion
- Quality control acceptance criteria for the standard reference material/continuing calibration verification (SRM/CCV) was 80 - 120% of the certified value, or plus/minus one times the method detection limit (MDL) for SRM concentrations less than five times the MDL
- Method blanks were prepared and analyzed at a frequency of one per day
- Instrument blank acceptance criteria was less than one MDL
- Instrument is not designed to be zeroed